

CLAIMS:

1. A method for routing, comprising:
 - obtaining a packet, the packet having an Internet Protocol destination address and a media access control destination address in a data structure;
 - determining whether a media access control destination address for the packet matches an interface of the packet;
 - determining whether the packet contains a routable protocol responsive to the media access control destination address matching the interface;
 - if the packet contains the routable protocol,
 - checking for layer-level validity of the packet;
 - marking the data structure associated with the packet to indicate the layer-level validity was checked;
 - checking for Internet Protocol options being supported and valid;
 - and
 - marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and
 - if the layer-level is valid and the Internet Protocol options are supported and valid,
 - accessing the Internet Protocol destination address from the packet;
 - looking for the Internet Protocol destination address in the routing table;
 - obtaining an address resolution table index stored in association with the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table;
 - and
 - storing in the data structure associated with the packet the address

address in a data structure;

determining whether the media access control destination address for the packet matches an interface of the packet;

determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control destination address not matching the interface;

if the packet is a packet for multicasting and multicasting is invoked,
accessing the Internet Protocol source address from the packet; and
checking a routing table for the Internet Protocol source address;

if the routing table contains the Internet Protocol source address,
checking for layer-level validity of the packet;

marking a data structure associated with the packet to indicate the layer-level validity was checked;

checking for Internet Protocol options being supported and valid;

and

marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and

if the layer-level is valid and the Internet Protocol options are supported and valid,

accessing the Internet Protocol destination address from the packet;
looking for the Internet Protocol destination address in the routing

table;

obtaining an address resolution table index stored in association with the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table;

and

storing in the data structure associated with the packet the address resolution table index obtained.

resolution table index obtained.

2. The method, according to claim 1, wherein the interface is an incoming interface.
3. The method, according to claim 1, wherein the interface is an outgoing interface.
4. The method, according to claim 1, wherein the routable protocol is an Internet Protocol, and wherein the Internet Protocol is version four.
5. The method, according to claim 1, wherein the routable protocol is an Internet Protocol, and wherein the Internet Protocol is version six.
6. The method, according to claim 1, further comprising: determining whether routing is supported within a network processing unit.
7. The method, according to claim 1, wherein the data structure is apportioned for a plurality of canonical frame headers.
8. The method, according to claim 7, wherein the address resolution table index is stored in a canonical frame header of the plurality of canonical frame headers.
9. The method, according to claim 1, wherein the routing table is substantially more compact than a general routing table.
10. The method, according to claim 1, wherein the look up is done by finding an exact match in the routing table of the Internet Protocol destination address.
11. A method for routing, comprising:
 - obtaining a packet, the packet having an Internet Protocol source address, an Internet Protocol destination address and a media access control destination

12. The method, according to claim 12, wherein the data structure is apportioned for a plurality of canonical frame headers.
13. The method, according to claim 12, wherein the routing table is substantially more compact than a general routing table.
14. The method, according to claim 12, wherein the look up is done by finding an exact match in the routing table to the destination address.
15. A method for bridging, comprising:
 - obtaining a packet, the packet having a media access control destination address in a data structure;
 - determining whether the media access control destination address for the packet matches an interface of the packet;
 - determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control address not matching the interface; and
 - if the packet is not a packet for multicasting or multicasting is not invoked,
 - looking for the media access control destination address in an address resolution table;
 - obtaining an address resolution table index stored in association with the media access control destination address in the address resolution table responsive to the media access control destination address being found in the address resolution table; and
 - storing in the data structure associated with the packet the address resolution table index obtained.
16. The method, according to claim 16, wherein the data structure is apportioned for having a canonical frame header, wherein the address resolution table index is stored in the canonical frame header.

17. The method, according to claim 16, further comprising checking whether the bridging is supported within a network processing unit.

18. A signal-bearing medium containing a program which, when executed by a processor, causes execution of a method for routing comprising:

- obtaining a packet, the packet having an Internet Protocol destination address and a media access control destination address in a data structure;

- determining whether a media access control destination address for the packet matches an interface of the packet;

- determining whether the packet contains a routable protocol responsive to the media access control destination address matching the interface;

- if the packet contains the routable protocol,

- checking for layer-level validity of the packet;

- marking the data structure associated with the packet to indicate the layer-level validity was checked;

- checking for Internet Protocol options being supported and valid;

- and

- marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and

- if the layer-level is valid and the Internet Protocol options are supported and valid,

- accessing the Internet Protocol destination address from the packet;

- looking for the Internet Protocol destination address in the routing table;

- obtaining an address resolution table index stored in association with the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table;

- and

- storing in the data structure associated with the packet the address

resolution table index obtained.

19. A signal-bearing medium containing a program which, when executed by a processor, causes execution of a method for routing comprising:

- obtaining a packet, the packet having an Internet Protocol source address, an Internet Protocol destination address and a media access control destination address in a data structure;

- determining whether the media access control destination address for the packet matches an interface of the packet;

- determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control destination address not matching the interface;

- if the packet is a packet for multicasting and multicasting is invoked,

- accessing the Internet Protocol source address from the packet; and

- checking a routing table for the Internet Protocol source address;

- if the routing table contains the Internet Protocol source address,

- checking for layer-level validity of the packet;

- marking a data structure associated with the packet to indicate the layer-level validity was checked;

- checking for Internet Protocol options being supported and valid;

and

- marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and

- if the layer-level is valid and the Internet Protocol options are supported and valid,

- accessing the Internet Protocol destination address from the packet;

- looking for the Internet Protocol destination address in the routing table;

- obtaining an address resolution table index stored in association with

the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table;
and

storing in the data structure associated with the packet the address resolution table index obtained.

20. A signal-bearing medium containing a program which, when executed by a processor, causes execution of a method for bridging comprising:

obtaining a packet, the packet having a media access control destination address in a data structure;

determining whether the media access control destination address for the packet matches an interface of the packet;

determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control address not matching the interface; and

if the packet is not a packet for multicasting or multicasting is not invoked,

looking for the media access control destination address in an address resolution table;

obtaining an address resolution table index stored in association with the media access control destination address in the address resolution table responsive to the media access control destination address being found in the address resolution table; and

storing in the data structure associated with the packet the address resolution table index obtained.

21. An apparatus for routing, comprising:

means for obtaining a packet, the packet having an Internet Protocol destination address and a media access control destination address in a data structure;

means for determining whether a media access control destination address

for the packet matches an interface of the packet;

means for determining whether the packet contains a routable protocol responsive to the media access control destination address matching the interface;

responsive to the packet contains the routable protocol,

means for checking for layer-level validity of the packet;

means for marking the data structure associated with the packet to indicate the layer-level validity was checked;

means for checking for Internet Protocol options being supported and valid; and

means for marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and

responsive to the layer-level is valid and the Internet Protocol options are supported and valid,

means for accessing the Internet Protocol destination address from the packet;

means for looking for the Internet Protocol destination address in the routing table;

means for obtaining an address resolution table index stored in association with the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table; and

means for storing in the data structure associated with the packet the address resolution table index obtained.

22. An apparatus for routing, comprising:

means for obtaining a packet, the packet having an Internet Protocol source address, an Internet Protocol destination address and a media access

control destination address in a data structure;

means for determining whether the media access control destination address for the packet matches an interface of the packet;

means for determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control destination address not matching the interface;

responsive to the packet is a packet for multicasting and multicasting is invoked,

means for accessing the Internet Protocol source address from the packet; and

means for checking a routing table for the Internet Protocol source address;

responsive to the routing table contains the Internet Protocol source address,

means for checking for layer-level validity of the packet;

means for marking a data structure associated with the packet to indicate the layer-level validity was checked;

means for checking for Internet Protocol options being supported and valid; and

means for marking the data structure associated with the packet to indicate the Internet Protocol options were checked for support and validity; and

responsive to the layer-level is valid and the Internet Protocol options are supported and valid,

means for accessing the Internet Protocol destination address from the packet;

means for looking for the Internet Protocol destination address in the routing table;

means for obtaining an address resolution table index stored in

association with the Internet Protocol destination address in the routing table responsive to the Internet Protocol destination address being found in the routing table; and

means for storing in the data structure associated with the packet the address resolution table index obtained.

23. An apparatus for bridging, comprising:

means for obtaining a packet, the packet having a media access control destination address in a data structure;

means for determining whether the media access control destination address for the packet matches an interface of the packet;

means for determining whether the packet is a multicast packet and whether multicast routing is invoked responsive to the media access control address not matching the interface; and

responsive to the packet is not a packet for multicasting or multicasting is not invoked,

means for looking for the media access control destination address in an address resolution table;

means for obtaining an address resolution table index stored in association with the media access control destination address in the address resolution table responsive to the media access control destination address being found in the address resolution table; and

means for storing in the data structure associated with the packet the address resolution table index obtained.

24. A method for routing, comprising:

obtaining a packet for network address translation, the packet having a media access control header;

determining if a network processing unit is in a pass-through mode responsive for the packet; and

responsive to the network processing unit not being in the pass-through mode,

obtaining a media access control source address from the media access control header is stored in an address resolution table;

determining whether an incoming interface is running network address translation; and

routing the packet responsive to the incoming interface not running the network address translation, the routing including,

obtaining an index from the packet to access routing information stored in a data structure.

25. The method, according to claim 24, wherein the pass-through mode is a firewall only mode.

26. The method, according to claim 24, further comprising:
determining whether the packet is for a multicast or broadcast frame;
determining whether the incoming interface equals an outgoing interface;
and
reading control bits for the packet responsive to the media access control source address obtained.

27. The method, according to claim 26, further comprising:
determining protocol type of the packet; and
determining whether the protocol type is supported on the outgoing interface.

28. The method, according to claim 27, further comprising determining whether broadcasting or multicasting is invoked for the outgoing interface.

29. An apparatus for routing, comprising:
means for obtaining a packet for network address translation, the packet

having a media access control header;

means for determining if a network processing unit is not in a pass-through mode responsive for the packet;

means for obtaining a media access control source address from the media access control header is stored in an address resolution table;

means for reading control bits for the packet responsive to the media access control source address obtained;

means for determining whether an incoming interface is running network address translation; and

means for routing the packet responsive to the incoming interface not running the network address translation, the means for routing including means for obtaining an index from the packet to access routing information stored in a data structure.

30. A signal-bearing medium containing a program which, when executed by a processor, causes execution of a method for routing comprising:

obtaining a packet for network address translation, the packet having a media access control header;

determining if a network processing unit is not in a pass-through mode responsive for the packet;

obtaining a media access control source address from the media access control header is stored in an address resolution table;

determining whether an incoming interface is running network address translation; and

routing the packet responsive to the incoming interface not running the network address translation, the routing including obtaining an index from the packet to access routing information stored in a data structure.

31. A method for routing a packet, comprising:

checking for layer-2 validity;

checking for layer-3 validity;
marking a header to indicate that the layer-2 validity check was done;
marking the header to indicate that the layer-3 validity check was done;
determining if a frame is for broadcasting or multicasting the packet;
if the frame is for broadcasting or multicasting the packet, determining if a host operating system is to process the packet; and
forwarding the packet to a host Internet Protocol stack responsive to a determination that the host operating system is to process the packet.

32. The method, according to claim 31, wherein responsive to a determination that the frame is neither a broadcast frame or a multicast frame, determining whether a media access control destination address for the packet matches an inbound interface address for the packet.

33. The method, according to claim 32, wherein responsive to the media access control destination address not matching the inbound interface address:
determining if bridging is supported by network interface circuitry; and
looking up the media access control destination address in an address resolution table.

34. The method, according to claim 33, further comprising:
obtaining an address resolution table index stored in association with the media access control destination address; and
storing the address resolution table index in a header of the packet.

35. The method, according to claim 32, further comprising determining whether a protocol of the packet is routable on an inbound interface for the packet.

36. The method, according to claim 35, further comprising:
determining whether network interface circuitry supports unicast routing;

checking for support for Internet Protocol options for the packet; and
looking up an Internet Protocol destination address for the packet in a
routing table.

37. The method, according to claim 31, wherein responsive to determining the frame is for multicasting but not for processing by the host operating system, determining if Internet Protocol routing is active.

38. The method, according to claim 37, further comprising determining whether an Internet Protocol source address for the packet is in a routing table.

39. The method, according to claim 38, further comprising:
determining whether network interface circuitry supports unicast routing;
checking for support for Internet Protocol options for the packet; and
looking up an Internet Protocol destination address for the packet in the
routing table.

40. A method for routing a packet, comprising:
checking for layer-2 validity;
marking a data structure associated with the packet to indicate the
checking of the layer-2 validity;
determining whether a media access control destination address for the
packet matches an interface address of the packet;
determining whether the packet contains a routable protocol responsive to
the media access control destination address matching the interface address;
responsive to the packet having the routable protocol,
checking for layer-3 validity;
marking the data structure associated with the packet to indicate the
checking of the layer-3 validity;
checking for Internet Protocol options for the packet; and

determining if an Internet Protocol destination address for the packet is in an address resolution table.

41. The method, according to claim 40, wherein in response to the packet having at least one Internet Protocol option,

checking the at least one Internet option; and

marking the data structure to indicate the checking of the at least one Internet option.

42. The method, according to claim 41, further comprising determining whether the routing of the packet is supported in network interface circuitry.

43. A method for routing a packet, comprising:

checking for layer-2 validity;

marking a data structure associated with the packet to indicate the checking of the layer-2 validity;

determining whether a media access control destination address for the packet matches an interface address of the packet;

determining if the packet is for a unicast or a broadcast;

determining if the packet is for a multicast frame;

responsive to the packet being for the multicast frame, determining whether Internet Protocol multicast routing is active;

responsive to the packet being for unicasting or broadcasting or not being for multicasting, determining whether bridging is supported in network interface circuitry;

looking for the media access control address for the packet in an address resolution table; and

storing an address resolution table index responsive to finding the media access control address in the address resolution table.

44. The method, according to claim 43, wherein the address resolution table index is stored in data structure associated with the packet.
45. A method for routing a packet, comprising:
- checking for layer-2 validity;
 - marking a data structure associated with the packet to indicate the checking of the layer-2 validity;
 - determining whether a media access control destination address for the packet matches an interface address of the packet;
 - determining if the packet is for a unicast or a broadcast;
 - determining if the packet is for a multicast frame;
 - responsive to the packet being for the multicast frame, determining whether Internet Protocol multicast routing is active;
 - responsive to multicast routing being active, determining if an Internet Protocol source address for the packet is in a routing table; and
 - obtaining reverse path forwarding interface information stored in association with the Internet Protocol source address in the routing table.
46. The method, according to claim 45, further comprising storing the reverse path forward interface information in a data structure associated with the packet.